Voice Switching Capability for Flight Service Stations

Mission Need Statement Number #320

1. Administrative Information

a. Title of mission need statement (MNS): Voice Switching Capability for Flight Service Stations

b. MNS Number: 320

c. Submission Date: 11/15/96

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Signatures

a. Submittal of mission need statement

/s/ Neil R. Planzer *3/24/97*

Director, Air Traffic System Requirements **Date**

b. JRC Mission Need Determination

/s/ Monte R. Belger *8/27/98*

Joint Resources Council Chairperson
Associate Administrator for Air Traffic Services, ATS-1 **Date**

c. Investment Decision

Joint Resources Council Chairperson
(FAA Acquisition Executive) **Date**

----- or ------

(Associate Administrator of Sponsoring Org) **Date**

d. In-Service Decision

(As designated by the JRC at the investment decision) **Date**

2. Mission Area

a. Description of the Mission Area

In order to fulfill its statutory mission, the FAA developed Flight Service Stations (FSS) and, subsequently, Automated Flight Service Stations (AFSS) to provide flight planning, advisory and communications service along the airways and at terminal areas. The objective of the AFSS program is to provide pilots with significantly improved access to flight planning, weather, communication and emergency services deemed essential to the conduct of safe and efficient flight. A secondary objective is to improve the efficiency of the pilot / specialist interface. The AFSS serves as a principal interface between the flight service specialist and the pilot.

In the course of providing its services, the AFSS' service approximately 35 million contacts annually[1]. The majority of these contacts are weather briefings. The AFSS program is among the most politically sensitive within the FAA. Inability to perform efficiently has been the subject of numerous congressional and media inquiries.

b. Mission Need

Operational efficiency of an AFSS, and thus the very accomplishment of its mission, is dependent upon the capability and reliability of its communication system. Reliable air-to-ground (A/G) and ground-to-ground (G/G) voice communications are therefore critical to the services that Automated Flight Service Stations (AFSS') provide to NAS users. This document addresses the need to sustain voice switching capability in the AFSS environment through the next decade with highly reliable, supportable, equipment and fewer operation and maintenance resources.

3. Needed Capability

a. Management / Statutory / Regulatory Authority

Public Law 103-272 is the statutory authority for aviation transportation matters and is codified as Title 49, United States Code. This law repealed the Federal Aviation Act of 1958. In part, the Administrator of the Federal Aviation Administration (FAA) is charged with regulation of air commerce and promotion of civil aeronautics. This law requires the FAA to manage the national airspace for the benefit of all users so that air travel is accomplished in a safe, orderly and efficient manner.

The FAA Strategic Plan provides the framework under which implementation of the FAA's mission will be accomplished. The Strategic Plan specifically identifies increased telecommunications capabilities as opportunities to improve NAS efficiency, safety and capacity.
It includes goals of refining the FAA Operational Concept and providing a cost-effective

[1] FAA Administrator's Fact Book, April, 1996

communications infrastructure, and committing the FAA to operating like a business to reduce and contain costs. The Strategic Plan provides a FY-97 milestone for installation of digital voice switches supporting end-to-end digital voice communications in the course of planning the evolution of ground/ground communications to a predominately digital network that will facilitate centralized end-to-end management of communications services[2].

The FAA Telecommunications Strategic Plan (TSP) includes direction to move the FAA to digital networking in an attempt to be cost effective and provide more efficient, manageable and maintainable system[3]. Consistent with the FAA Strategic Plan; conversion to end-to-end digital communication is a stated priority[4]. At the same time one of the stated goals of this plan includes cost containment. The 1994 edition of the Airway Facilities Concept of Operations for the Future provides a long range plan which includes the implementation of a three-tiered operations and maintenance organization architecture which will utilize Remote Maintenance Monitoring (RMM) to facilitate the containment of costs.

b. Functional Capability

The FAA's Flight Service Station (FSS) Issues Workgroup conducted an internal study which was completed in December, 1995 which reaffirmed the mission and functions of the AFSS. Included in this study were recommendations which confirmed the need to maintain 61 AFSS addressed the need for equipment modernization to precede any reductions in human resources and facilities in order to maintain current services to the flying public. The workgroup's recommendations also addressed the need to increase pilots' ability to obtain flight information via automation and cited the replacement of the current voice switching system as a step toward this goal. The needed capability will include the following enhancements:

Supportability

- Technology supportable into the next decade reducing the risk of losing contractor support for obsolete equipment and the increased cost of supporting obsolete technology in a sole source environment.

- Utilization of telephone industry standard components will ensure the availability of spare parts.

- Utilization of commercially available peripherals.

[2] FAA Strategic Plan, Vol. 2 page 30.

[3] FAA Telecommunications Strategic Plan page 6-1.

[4] FAA Telecommunications Strategic Plan page 6-13.

Maintainability / Cost

- Lower operations and maintenance cost driven by increased reliability and maintainability as well as the decreasing cost of the newer hardware over time.

- Internal self-diagnostics to isolate failures to the LRU level and capable of being remotely monitored supporting the OCC concept allowing centralized maintenance operations and techniques[5].

- Digital architecture will facilitate end-to-end monitoring and troubleshooting of NAS communications systems. Digital architecture will also eliminate the need for analog to digital conversion of signals adding to operations costs.

- Use of centralized remote maintenance monitoring will reduce reliance on on-site technicians and help to contain costs.

- Utilization of a minimum number of reconfigurable commercial circuit card types to reduce spares, supply administration, training administration and publications costs.

- Potential to utilize logistics resources (e.g. tech data, spares, training, support equipment) developed to support other voice switches lowering life cycle cost by standardizing field configurations.

Operational Capability / Performance

- Scaleable architecture to support realignment of in-flight functions while meeting demands for service.

- Increased automation to support a smaller workforce and to contain operating costs. This capability would include the necessary telephone lines for computer connections, graphics display and voice communications thus enabling the Operational and Supportability Implementation System (OASIS) (CIP project 43-22) to support interactive briefing services for pilots.

Detailed capabilities envisioned to be provided to fulfill this mission need are summarized in Table (1).

[5] Airway Facilities Concept of Operations for the Future, page 1-4, AOP-300 RMM Requirements paragraph 3.

Planned Operational Capability / Performance

1. Capable of interface with existing external A/G and G/G circuits.

2. VHF/UHF channels for transmission of pre-recorded and / or computer generated messages.

3. VHF/UHF channels for enroute flight advisory service between specialists and users.

4. VHF/UHF for inflight service between specialists and users.

5. Capability to reconfigure communications to support changes in operating position responsibilities.

6. Improved / standard user interface that facilitates higher flight service specialist productivity.

7. Compatible with digital communications systems used by U.S. telecommunications companies providing improved connectivity. Based on, or compliant with, standards for digital carriers such as T-1 or ISDN

8. Improved intra-system audio quality (low noise and harmonic distortion).

9. Improved communications quality facilitating end-to-end digital voice communications.

10. Facilitates transparent connection between all Air Traffic Control Specialists anywhere in the world on the ground or in the air

11. Flexible telephone numbering plan.

12. Internationally accepted standard network management interfaces and protocols.

13. RMM capability supportive of quick look and constant monitor screens at the OCC.

14. Fault-tolerant design.

15. Returns to last programmed configuration upon restoration of power without operator intervention.

16. Reprogrammable / upgradable facilitating upgrades during the life cycle.

17. Non-blocking.

18. Improved management information system / reports.

19. Smaller size requiring less floor and rack space.

20. Specialist training capability.

21. Supports interactive preflight briefings by connection to customers' personal computers

22. Provides access to regional pre-recorded preflight briefings.

23. Capable of off-loading / remoting radio frequencies

Table (1)

4. Rationale for the Acquisition

a. Current Capability

1. ICSS Phase 1

Voice switching capability for the AFSS' and support facilities is provided by the Type III Integrated Communications Switching System (ICSS) Phase 1 systems which were manufactured by Litton AMECOM and Denro, Inc. The Type III ICSS systems were originally provided under Capital Investment Plan (CIP) project 23-13 in the mid to late 1980s the oldest of which, manufactured by Litton, are now over ten years old. These systems are a variant of the Type II ICSS' used in Airport Traffic Control Towers (ATCTs) and Terminal Radar Approach Control (TRACON) facilities which have been tailored for use in the AFSS environment. Like the ATCT / TRACON ICSS' they can have up to 80 positions although the current maximum is 36. In addition, they have three principal peripheral pieces of equipment; a Voice Retrieval System (VRS), an Automatic Call Distributor (ACD), a Traffic Management Information System (TIMS) all of which are unique to the AFSS mission.

The Type III ICSS provides connectivity from the flight service specialists to Air / Ground (A/G) and Ground / Ground (G/G) transmission facilities. The Type III also provides the ability to interpret and service call initiation and termination requests, call processing for Air / Ground (A/G) and Ground / Ground (G/G) communications and special call features such as conferencing and common answer queues.

Voice switching capability in the Alaskan Region Flight Service Stations (FSS) is provided by a mixed inventory of 14 analog voice switches including FA-8165 and FA-9334 electromechanical units that are 20 or more years old and have poor parts availablity.

Table (2) summarizes services provided by AFSS to pilots and Figure (1) provides a diagram of the Type III ICSS and its interfaces in the NAS[6]:

[6] Future FAA Telecommunications Plan (Fuchsia Book) April, 1995 page 14-4

AFSS Services

Processing flight plans, FASTFILE flight plan filings	Processing pre/in-flight weather briefings	Providing pre/in-flight aeronautical information
Providing enroute communications	Telephone Information Briefing Services (TIBS)	Pilot Automatic Telephone Weather Answering Service (PATWAS)
Monitoring navigation aids	Disseminating Notices to Airmen (NOTAMS)	Processing Pilot Reports (PIREPS)
Initiating Search and Rescue	Provide emergency services	Broadcast services
	Hazardous Inflight Weather Advisory Service (HIWAS)	

Table (2)

Type III ICSS Interfaces

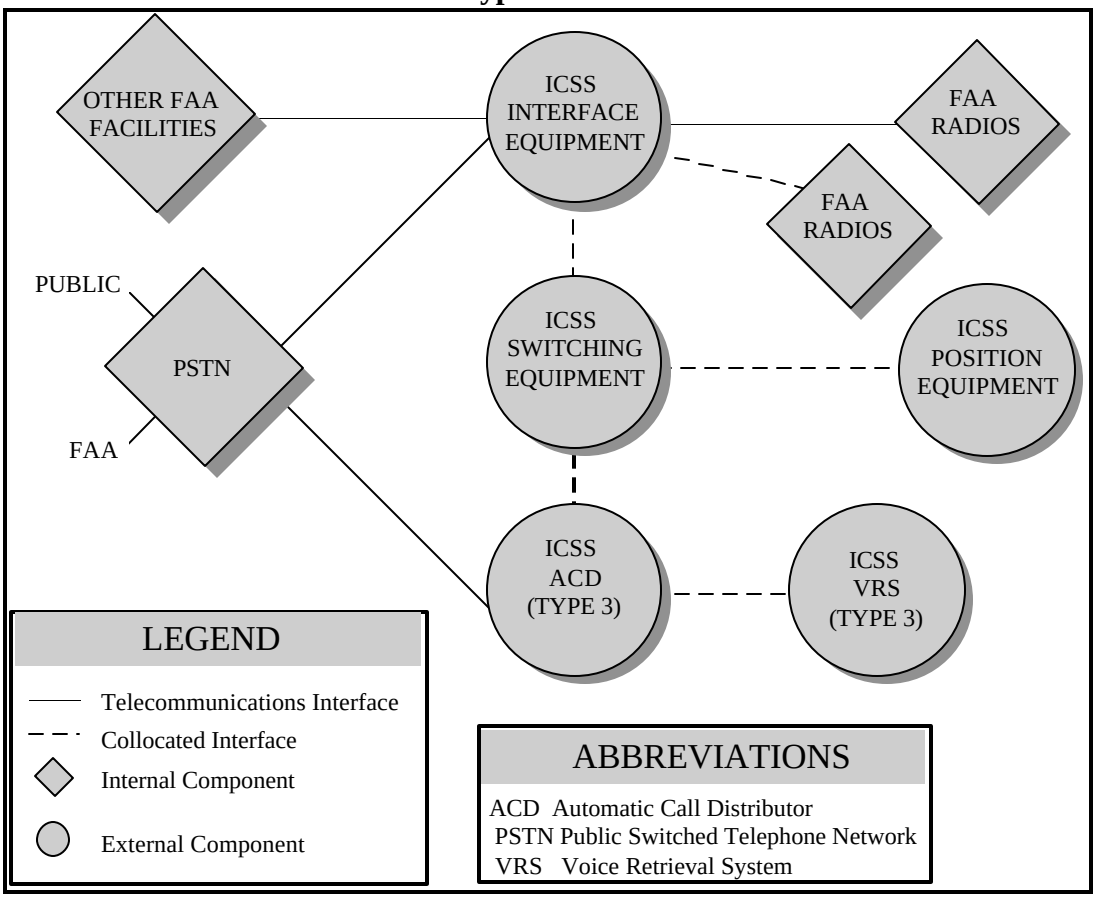

Figure (1)

2. ICSS Phase 1A

In December, 1988 a contract was awarded to Denro for 23 additional Type III systems manufactured to the latest production baseline. In September, 1993 a three-year contract to upgrade 15 Denro Type III, Phase 1, systems to the Phase 1A was awarded to Denro. These systems are the latest models of the Type III and include updates of the commercial peripheral equipment. This upgrade brought the Denro Type III ICSS inventory to a common baseline and addressed supportability concerns relative to the peripherals.

3. Inventory Status

The current inventory of AFSS Litton Type III voice switches were commissioned between June, 1985 and September, 1987. The Denro Type III Phase 1A / Phase 1A Upgrade switches were commissioned and upgraded in the late 1980's and through 1995. The inventory of voice switches supporting AFSS in the lower fourty-eight states and the Alaskan Region is summarized below.

ICSS Type III Inventory

	FA-8165/FA-9334	Litton	Denro
Phase 1	0	31	0
Phase 1A	0	0	33
AAL FSS	14	0	0

4. Technology

Type III ICSS', both Phase 1 and Phase 1A, are not currently in production. These systems use early, first generation, digital technology including Microlog Z-80 microprocessors in the switching equipment. As industry has migrated away from analog and first generation digital technology in voice switches, the FAA has planned to evolve its equipment accordingly. Type II ICSS voice switch equipment at ATCTs and TRACON facilities, of which the Type III is a variant, is planned to be replaced with digital equipment under the Enhanced Terminal Voice Switch (ETVS) project beginning in 1997 and ending in 2004. Implementation of the ETVS will be the first large-scale implementation of digital voice switches consistent with the goals stated in the FAA Strategic Plan.

Voice switches supporting the Alaskan Region FSS are also no longer in production. They utilize similar vintage technology which is rapidly becoming obsolete.

The peripheral equipment for the Denro and Litton Type III ICSS includes components that are technologically obsolete such as platter-type disk drives, cartridge tape drives which are either unobtainable or supplied and / or repaired by single commercial sources. The cost to replace the Denro peripherals was $208,000. An estimate provided by Litton in late 1995 for replacement of obsolete peripherals and updating logistics resources totaled $6.2M.

5. ICSS Maintenance

Litton Type III ICSS

Litton Type III ICSS' are currently supported under a Contractor Maintenance Logistics Support (CMLS) concept that provides for complete contractor maintenance of these systems. The contract with Litton Amecom is a fixed-price (with economic price adjustment) contract. The FAA has assumed site level maintenance responsibility in FY-96 changing the nature of this contract to Contractor Depot Logistics Support (CDLS). The contract will expire in June, 2002. The next price adjustment is due in September, 1996. The current (FY-96) cost for contractor depot repair support of the Litton Type III ICSS, exclusive of the price adjustment, is $1.8M.

Under the maintenance concept adopted for the Litton Type III ICSS, the FAA has not procured depot level technical data (e.g. drawings, manuals), depot tools and test equipment, or depot spare and repair parts. Therefore, the FAA cannot assume organic (in-house) support for the Litton systems without undertaking the investment in these resources.

Denro Type III ICSS

Denro Type III ICSS' were supported at the site level by FAA technicians and at the depot level by a CDLS contract with Denro. This contract was similar to the Litton contract with the exception of the timing of the economic price adjustment. The FAA has assumed depot maintenance responsibilities for Phase 1A and upgraded Phase 1 Type IIIs in FY-96 completing the transition from contractor to organic (in-house) maintenance. Support under the Denro contract was costing the FAA $3.3 million dollars per year in its final year. Projected annual costs for FAALC depot support are $1.6 million and the FAALC expects to be able to provide support for the foreseeable future; but not indefinitely.

6. AF Field Staffing

The number of Airway Facilities (AF) maintenance technicians available to perform maintenance and operations functions on NAS equipment has been declining over the past three years. Figure (2) below illustrates the draw-down of the AF field maintenance personnel by showing the maximum year-end staffing. Airway Facilities will therefore be faced with the challenge of maintaining the same facilities and services with fewer personnel in the future. This challenge is addressed in the AF Concept of Operations for the Future which envisions a smaller technician workforce working from a smaller number of System Management Offices (SMOs). Maintenance will then be dependent on highly reliable equipment that incorporates remote monitoring capabilities to maintain a high state of system availability.

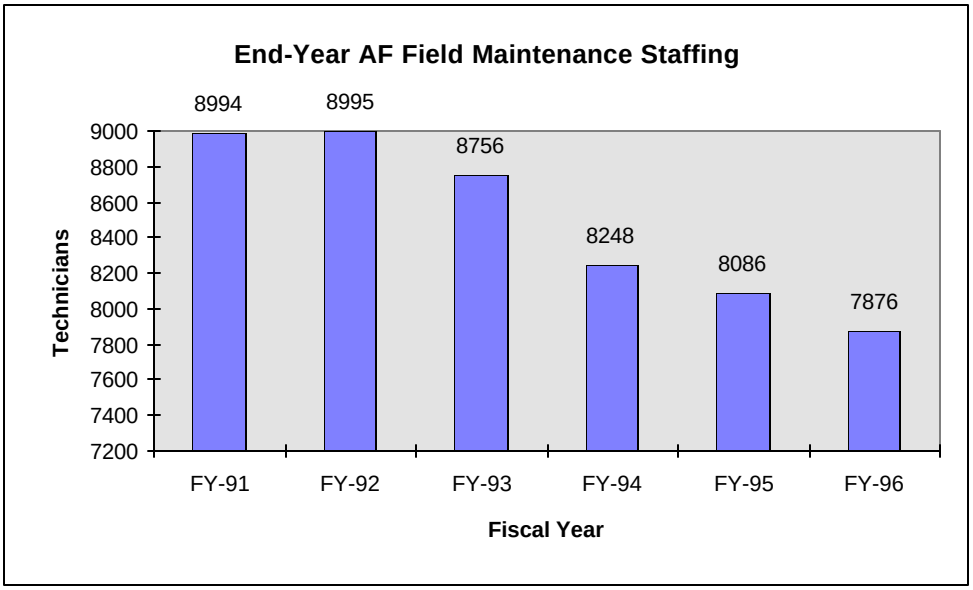

Figure (2)[7]

7. ICSS Logistics Support

The Type III ICSS' are supported by two separate resident maintenance courses. Two courses are necessary because the Litton and Denro systems, although functionally identical, are not physically identical.

8. ICSS Reliability / Availability

The fixed price nature and specific response times of the two maintenance and logistics support contracts have limited the FAA's risk of increased operations cost due to equipment reliability problems. With the assumption of maintenance responsibility the FAA has reduced the cost of maintenance actions but the challenge of maintaining availability given equipment maintainability remains.

9. AFSS Operations

With the closure of the Flight Service Stations (FSS) (with the exception of those in AAL) and consolidation of functions to the AFSS, the flight service specialist workforce is being drawn down. Figure (3) below summarizes this downward trend. Current year budget resolutions indicate that this trend will continue. In this environment, the FAA is challenged to provide an increasing level of service with fewer personnel supported by technology[8]. Studies by the Flight Service Architecture Working Group recommend that staffing levels not fall much below 3000 without technology investment.

[7] Source AFZ-200, April, 1996

[8] Aviation System Capital Investment Plan January, 1996 page 2-6.

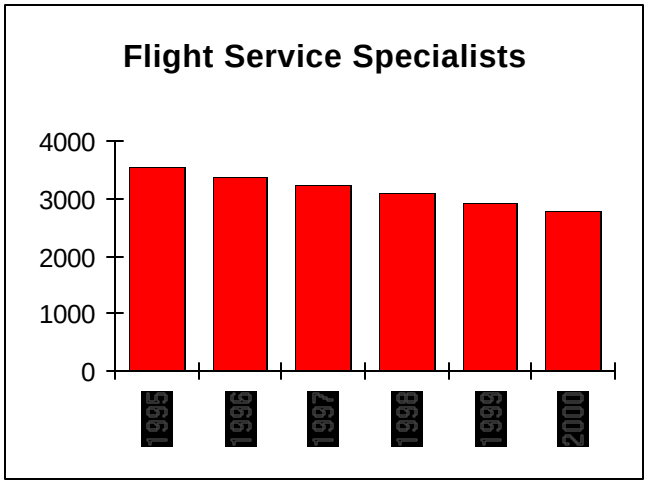

Figure (3)[9]

b. Capability Shortfall

1. Supportability

The technology embedded in the Type III ICSS is aging and will become increasingly difficult to support beyond 1996 according to studies performed in support of the Air/Ground Communications Master Plan in July, 1994. Experience over the past two years with equipment obsolescence has included Line Replaceable Units (LRUs) which commercial users have previously replaced. The FAA is currently experiencing difficulty in supporting the Denro Type III critical peripherals due to parts obsolescence. The Litton Type III ICSS systems, under Litton depot support, are encountering similar supportability problems with the
BBL-manufactured VRS and SSE-manufactured ACD.

There is a risk of retaining the aging Litton Type III ICSS equipment beyond June, 2002 when the Contractor Depot Logistics Support (CDLS) contract expires. A market survey of voice switch manufacturers conducted in early FY-94 indicated that industry was moving toward digital systems. Research of current trends in the voice switch market indicates that the architecture used in the Type IIIs are continuing to evolve. Given these trends, the potential for loss of depot support in the out years is significant. Without additional voice switch business, longer term support from Litton beyond June, 2002 is questionable. If support can be obtained for the current technology in the out years, it can be expected to be obtained at a significantly higher price.

Unlike the ATCTs and TRACONs there is no replacement capability identified for the AFSS' at this time. Type II ICSS, which are the most closely related equipment, are due to be replaced beginning in 1996 with the Enhanced Terminal Voice Switch (ETVS); a digital voice switch. Consequently the Type III ICSS' will, without identification of a replacement, remain the last voice switch system of its

[9] Source ATR-121

generation in the FAA inventory as the end of the decade approaches. Maintenance and supportability of vintage voice switching systems has proven costly and difficult in the past as evidenced by the cost of AT&T maintenance for the Western Electric Co. (WECO) switches used in ATCTs and TRACONs.

2. Maintainability

Maintenance of the existing Type III systems represent a burden on the field maintenance workforce and breach the FAAs requirement for maintenance actions to be 30 minutes or less and the frequency of maintenance actions to be once per quarter[10]. Site maintenance data provided by Litton shows that the average Litton Type III ICSS requires 4 hours and 57 minutes of corrective maintenance per month. Data provided by Denro shows that the average Denro Type III Phase 1A Upgrade, while under contractor maintenance, required over 25 hours of corrective maintenance per month.

3. Cost

The Type III ICSS predate AF requirements for Remote Maintenance Monitoring (RMM) and end-to-end monitoring capability and are maintained by on-site personnel. Over time, these systems, compared to their more modern counterparts, will be more costly to maintain without this maintainability feature. The lack of RMM capabilities constrains the ability of AF to better utilize its reduced workforce. The Telecommunications Strategic Plan (TSP) states that this RMM capability is required as part of the initiative to establish Operations Control Centers (OCCs), support multipoint monitoring and control, and contain costs[11].

Because technicians are not dedicated to the maintenance of a single configuration they must complete two different training courses. This requires additional staff hours be allocated to training, additional travel, and increased administrative costs. The additional time away from direct maintenance places an additional burden on the AF workforce as personnel levels are reduced.

In addition to the voice switches themselves, the FAA must maintain or lease T-1 channel banks to perform analog to digital conversion of signals to commercial communications lines and LINCS.

4. Facility Space

The equipment required to support the analog to digital conversion of signals discussed above requires two to three standard racks of equipment in each AFSS. This space might be used to offset other requirements for facility expansion.

5. Operational Capability

[10] FAA Order 6000.30B paragraphs 9(k) and 11(b).

[11] FAA Telecommunications Strategic Plan page 7-13, Airway Facilities Concept of Operations for the Future page 1-4.

The Type III ICSS do not provide needed capabilities to meet the needs of specialists to fulfill their mission and for the mission to be accomplished with fewer resources.

The declining number of specialists and Air Traffic's projected need to further consolidate facilities to conserve resources require position equipment that can be reconfigured by site personnel (AF or AT) to meet operational needs.

The Type III ICSS do not allow radio frequencies to be off-loaded in a manner similar to rerouting telephone calls using the voice switch. This directly impacts service when natural disasters force closure of a facility. The lack of this capability also constrains the FAA from consolidating facilities during off-peak hours to conserve resources.

The Type III ICSS does not provide a seamless interface with U.S. telecommunications companies[12] which affects operations cost. Unlike an end-to-end digital network, the required analog / digital conversions between voice switches affects sound quality, require additional monitors for the analog and digital system segments and increased logistics support resources.

6. Capacity

The Type III ICSS do not provide the needed voice switching capacity projected to be required by AT to allow for consolidation of AFSS operations. The Type III ICSS are constrained to 252 ports divided between radios, telephones and operators. Additional ports are required to affect consolidation of AFSS operations.

Because the Type III ICSS switch equipment is no longer in production, the ability of the FAA to change the size of the existing AFSS' to meet capacity needs is limited. The FAA will therefore be constrained from reallocating existing equipment or consolidating operations to meet AT requirements and budgetary constraints. Even if the equipment could be reallocated, and the size of a facility could be changed, the throughput of communications will be adversely affected.

The Type III ICSS' do not provide the productivity features necessary to support the continued drawdown in the flight service specialist workforce and consolidation of services in the AFSS'. These features include off-loading of radio frequencies in emergency situations or to conserve resources, ability to reconfigure operator positions and telecommunications connections for future automation including OASIS.

[12] FAA Telecommunications Strategic Plan page 3-6.

5. Impact of Disapproving the Mission Need

a. Impact

1. Supportability

Aging technology may become unsupportable as industry and the rest of the FAA inventory moves away from technology imbedded in the Type III ICSS. The Type III ICSS would become the only voice switch of its vintage in the inventory and would be subject to increases in spare/repair parts and depot repair costs as sources decrease or disappear.

As the electronic technician work force is drawn down the fixed level of maintenance required by Type III ICSS will present an increased burden on the AF maintenance organization.

Without fielding replacement equipment before June 2002, a new maintenance contract will have to be developed and negotiated for the Litton Type III systems. Given the age of the existing equipment at that time; such an option may not be available or will be costly.

Beginning the process of acquiring replacement equipment beginning in the 1998 timeframe will put the FAA in a position to smoothly transition voice switches at the AFSS to new technology while minimizing the risk of the loss of depot support. Concurrent removal of the existing switches and installation of new equipment at this time will provide a source of hardware to support the old switches at the end of their life cycle without relying on cannibalization.

2. Maintainability / Cost

Depot maintenance costs for the Litton Type III would continue in accordance with the current maintenance contract and would change with the Consumer Price Index until June, 2002. The FAA may experience significant cost increases if the contract cannot be extended to cover extended life cycle. Costs may climb steeply in sole source environment after contract lapses and industry migrates away from use of the technology imbedded in the Type IIIs. Should the contractor or the FAA be unable to provide depot support for the Type III ICSS there is a risk of having to design replacement parts and higher level assemblies.

The FAA would forego potential savings in operations costs from highly reliable equipment. Additional operations savings from standardization of the voice switch inventory would be foregone if an existing voice switch, or parts thereof, could be used to satisfy the AFSS requirement.

Disapproval of this acquisition would not provide the needed investment in equipment necessary to provide the capability needed to facilitate reduction in the operations costs associated with AFSS services.

3. Operational Capability

Maintaining the existing switch technology constrains the FAA from further consolidating flight service facilities to reduce operating costs while maintaining service levels. Without a technology update, further consolidation of facilities cannot be accomplished.

Maintaining the existing switches that do not include RMM capability is contrary to the FAA Airway Facilities Concept of Operations for the Future in which the strategy of RMM development and deployment is characterized as a national priority and integral to the future maintenance concept using Operational Control Centers[13].

Maintaining two configurations of voice switches, with differing capabilities, in the AFSS' will preclude the off-loading of radio frequencies and closure of facilities during off-peak hours to conserve resources.

4. Capacity

Maintaining existing voice switches will not provide productivity improvements necessary to provide services with fewer flight service specialists. Future operational savings are dependent on an additional investment in technology that provides productivity improvements.

As declining budgets force the FAA to consolidate AFSS operations to conserve funds and maintain current service levels; the process of consolidation will be severely constrained by the lack of capacity in the existing switches to accommodate consolidation.

b. Timeframe

This mission need statement addresses the need for near-term sustainment (1999-2004) of voice communications between flight service specialists and NAS users. Sustainment will become an issue because both the Litton and Denro Type III ICSS' will reach the end of their expected life-cycles early in the next decade. As stated earlier, it is in 2002 that the depot support contract for the Litton Type III ICSS' will expire and the FAA does not have the capability to provide depot level support for these systems supporting half of the AFSS facilities. In the same timeframe, the flight service specialist workforce will have been drawn down to the minimum level (3000) capable of providing services using existing equipment.

c. Criticality

There is a projected, critical, need for continued flight services delineated in Table (2) above. Voice communications and voice switching capability are essential for the delivery of these services. There is no known technology that will obviate this need in the foreseeable future.

[13] Airway Facilities Concept of Operations for the Future, page 4-5, FAA Telecommunications Strategic Plan pages 2-2, 4-5 and D-3.

This mission need relative to other agency needs is not critical in terms of its effect on safety. Allowing for acquisition and production lead time of 18 months and installation time of 4 weeks per system; this mission need is urgent in terms of providing voice communications in the flight service environment at an affordable cost.

The projected impact of delayed funding on this project would be to delay replacement of the Litton systems beyond 2002 when the depot maintenance contract expires and supportability of these systems becomes critical. This project would commence and conclude replacement of the Litton systems before that time.

6. Long Range Resource Allocation Plan (LRRAP) Resource Estimate

a. Resource Estimate

FY-99 $M

Cost Estimation	FY-99	FY-00	FY-01	FY-02	FY-03	FY-04	FY-05	Total
F&E Cost	16.87	14.26	14.26	14.26	14.26	14.26	11.67	99.86
O&M Cost	0.00	2.02	3.76	5.49	7.23	8.97	10.39	37.86
Life-Cycle Cost (LCC)	16.87	16.28	18.02	19.76	21.50	23.23	22.06	137.72
Discounted LCC	16.87	15.22	15.74	16.13	16.40	16.57	14.70	

b. Basis of Estimate

This estimate is based on analogies using the Enhanced Terminal Voice Switch (ETVS) Basic System #3 (BS-3) for AFSS replacement and the Small Tower Voice Switch (STVS) to estimate Alaskan Region FSS requirements. Existing Type III ICSS system sizes (37 positions, 45 trunks, uninterruptable power supply) were assumed and the cost of latest design Cortelco-manufactured peripherals (ACD, VRS, and ATS) were included. A total of 64 sites was assumed which includes both AFSS facilities and support (e.g. depot and training) sites. A total of 14 FSS sites was used for the Alaskan Region. An installation rate of 11 systems per year was assumed for the AFSS replacement and rate of 14 was used for the FSS replacement. The rates for the replacement may need to be adjusted to ensure installations are complete before the depot support contract for the Litton systems expires. The total discounted life-cycle cost shown above represents the estimated amount of resources required in FY-99 dollars discounted at a rate of 7%.

c. Included in Estimate

Components of the above F&E estimate include system engineering / project management, prime mission equipment/software, peripheral equipment, testing, installation and assembly, training, peculiar support equipment, installation and test, system engineering/program data, site preparation and facilities costs, common support equipment, initial spares, and test and evaluation. The O&M estimate was built on the estimate of prime mission equipment.

7. Recommendations

a. This mission need be approved by the Joint Resource Council (JRC).

b. Approve performance of in-depth investment analysis activities.